Equipment/Resources Available in the USUHS Biomedical Instrumentation Center (BIC)

Three Divisions of BIC

1. Proteomics/Genomics
2. Flow Cytometry
3. Imaging

BIC Proteomics/Genomics Core Facility
Synthesis and Sequencing Facility

Location: A2007 (current); G230 (~Sept 2006)

Contacts:
Michael Flora (Facility Director: 301-295-3656; mflora@usuhs.mil)
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Carmen Quiles (301-295-9033; cquiles@usuhs.mil)

Synthesis and Sequencing Equipment

Applied Biosystems 3130XL DNA Sequencer

Primarily used for fluorescent DNA sequencing (Average read of a typical sample is 800-1000 bases).

Can also be used for fragment analysis (ie, SNP detection)

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Applied Biosystems 433A Peptide Synthesizer

For synthesis of peptides ranging from 2-48 amino acids

Applied Biosystems 3900 DNA Synthesizer

For synthesis of oligonucleotides ranging from 6-148 bases

High Performance Liquid Chromatography (HPLC)

For analytical analysis and purification of biomolecules

Equipment includes a Waters 626 with photodiode array (PDA) detector, an Agilent 1200 with a PDA and a BioCad 700e high-throughput purification HPLC

Applied Biosystems Voyager DE MALDI-TOF Mass Spectrometer

High sensitivity mass spectrometer used for protein identification from tryptic or other endopeptidase digest, and for confirmation of molecular weight of synthetic peptides

Automated agar plate production system

Automatically fills 300 culture plates (15 mm x 100 mm) in ~1 hour with prepared media/agar

Applied Biosystems 7500 Real time PCR System

For RT-PCR/quantitative PCR applications

Applied Biosystems 9800 Thermal Cycler

Ultra fast ramping thermal cycler cuts PCR cycling times 30-70%

Other proteomics/genomics resources

Fuji FLA-5000/LAS-3000 (C2113)

Contact: Jim Schooley; jschooley@usuhs.mil

FLA-5000 imaging system: Four-laser system (473 nm, 532 nm, 635 nm and 670 nm) that allows scanning of fluorescent and radioisotopic samples as large as 40 x 46 cm at resolutions from 10 to 200 microns. This system is especially suitable for protein electrophoresis in the proteomics field and general array analysis for genomics.

LAS-3000 imaging system: CCD-camera system (3 million octagonal megapixels) that can capture chemiluminescence, multi-color fluorescence, and epi-illuminated or trans-illuminated images. The LAS-3000 is especially suitable for Western blot analysis. High sensitivity chemiluminescent detection has sensitivity comparable to X-ray films, with much greater dynamic range (4.5-logs vs 2-logs for film).

Multi-Gauge software: For quantitative digital analysis of data acquired on the FLA-5000/LAS-3000 system. USU has a site license.

Note that the following items are NOT BIC equipment. These machines were purchased with REA funds. This equipment has been made available to the USU community on a limited basis, by the courtesy of the PIs in whose labs this equipment resides. Thus, *requests* for use of this equipment (as opposed to *demands*) are appropriate.

Real-time PCR machines

Real-time PCR machines are in the laboratories of Dr. Gabriela Dveksler (gdveksler@usuhs.mil) and Dr. Joseph McCabe (jmccabe@usuhs.mil), and are available for use by the USU community.

Microarray equipment

A microarray reader is housed in Pathology (contact: Dr. Mary Lou Cutler; mcutler@usuhs.mil). Capable of reading custom and commercial microarrays.

A Genetix QArray2 microarray spotter is housed in BIC G014 (contact Dr. Scott Merrell); (dmerrell@usuhs.mil). Allows spotting of user-designed microarrays on glass slides.

BIC Flow Cytometry Core Facility

Location: Central BIC Facility, G230

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Karen Wolcott (Facility Director: 301-295-3544; kwolcott@usuhs.mil)
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Flow Cytometry Equipment

Beckman Coulter EPICS XL-MCL Cell Analyzer

One 20mW Argon (488 nm) laser, capable of detecting four fluorochromes simultaneously.

Four wavelengths (FL1, FL2, FL3 and FL4) detected from the 488 nm argon Laser.

BD Biosciences LSR II Cell Analyzer

Three lasers 20 mW Argon (488 nm); 25 mW HeNe (635 nm); 20 mW UV laser (355 nm)

This state of the art flow cytometry cell analyzer is capable of detecting 8 fluorochromes simultaneously:

- Four wavelengths (FL1, FL2, FL3 and FL4) detected from the 488 nm argon laser
- Two wavelengths (FL7 and FL8) detected from the 355 nm UV laser
- Two wavelengths (FL9 and FL10) detected from the 635 nm HeNe laser

BD Biosciences FACSAria Cell Sorter

Three air-cooled lasers at 488-nm, 633-nm, and 407-nm wavelengths
Digital acquisition rates of up to 70,000 events/second
Multicolor analysis of up to 15 parameters
7-parameters from the 488 laser; 3 from 633 laser; 3 from 407 laser
Two- and four-way bulk sorting devices for a variety of tube sizes
BDTM Automated Cell Deposition Unit (ACDU) for sorting to Multi-well plates or microscope slides
Aerosol Management Option for safe sorts of biohazardous samples

Luminex® 100 System

Multi-analyte bioassay detection system capable of performing up to 100 assays simultaneously in a single microtiter plate well.

Multiplexed immunoassays, and other assays based on nucleic acids, enzyme function, and receptor-ligand interactions.

Other Flow Cytometry Services

Computer workstations for off-line analysis of FACS data

Two Windows-PC systems equipped with WinList software for off-line analysis of FACS data.

BIC Imaging Core Facility

(B3131, B2064, G233)

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Imaging Equipment
Updated December 2006

Zeiss Pascal Laser Scanning Confocal Microscope (B3131)

PASCAL system for Laser Scanning Confocal Microscopy (LSCM) to visualize cells. Light scatter is eliminated by the imaging system hardware, allowing for extremely fine detail and resolution. Fluorescence is detected using a photomultiplier tube (PMT).

Three lasers provide five distinct Excitation wavelengths: 405 nm, 458 nm, 488 nm, 514 nm, and 543 nm.

Lasers plus filters allow detection of at least 7 distinct fluorescent-labeled molecules in a single sample. Emission Filers are: BP420-480, BP470-500, BP505-530, BP 500-550, BP520-550, BP560-615, BP635-675, BP585-625, LP 590, LP 635, LP 560, LP 745, BP 530-600, BP 680-730.

Computer-controlled xyz-scanning stage

Heated stage and environmentally-controlled chambers available for live cell imaging

Many DIC, Air and Oil objectives available from 10X to 100X magnification

Advanced software packages for performing 3D-reconstruction, fluorescence resonance energy transfer (FRET) experiments, marker co-localization, etc. Packages are from Media Cybernetics' Auto-quant, 3D Constructor, Auto-pro-Plus, as well as Metamorph, Image-J, and Adobe Photoshop.

Separate workstations available for off-line data analysis.

Leica DM RXA Fluorescence Microscope (G230)

Light scatter is corrected using software (digital deconvolution). Fluorescence is detected with a CCD camera.

Upright fluorescent system can collect images with a magnification range of 2.5x to 160x

Philips CM100 Electron Microscope (B2064)

Transmission electron microscope

High contrast observation of sections.

Negatively stained, heavy metal stained or immuno-gold labeled specimens may be employed.

Electron Microscopy Sample Services (B2064)

A wide range of services are available to the USUHS research community at very competitive prices. These services include:

Full specimen preparation including fixation (aldehyde and/or OsO_4), dehydration in ethanol or acetone, infiltration of epoxy or acrylic resin, polymerization, sectioning, and post-staining of grids.

Imaging and analysis (examination of grids and collection of digital or photographic images).

Immunogold labeling of proteins of interest (customer must supply antibodies).

Negative staining.

Other Imaging Services

Image Processing Workstations (B2064, B3131, G232)

Mac and PC workstations with a variety of image processing software are available. Color printers are also available. Inquire for further details.

Technical Assistance for Image Acquisition and Image Processing (G232)

Professional help is available for users who need assistance with acquisition and image processing. Custom computer programming is available from Dr. Jozsef Czege. Inquire for further details.